

REMARKS

The Official Action mailed November 20, 2002 has been received and its contents carefully noted. This response is filed within three months of the mailing date of the Official Action and therefore is believed to be timely without extension of time. Accordingly, the Applicants respectfully submit that this response is being timely filed.

The Applicants note with appreciation the consideration of the Information Disclosure Statements filed on December 19, 2001; April 26, 2002; July 5, 2002, and July 16, 2002. As noted in Applicant's previous response, Paragraph 2 of the Official Action mailed April 24, 2002 asserted that the Information Disclosure Statement filed June 29, 2001 does not comply with 37 CFR 1.98(a)(2). The present Official Action fails to address this matter and applicant respectfully requests clarification in the following Action.

Specifically, on the face of the signed copy of the IDS, the Examiner has crossed through one Japanese reference and seven articles. The Applicants respectfully submit that all of the references are available in parent application Serial No. 09/352,198. Specifically, the IDS is in compliance with 37 CFR 1.98(d)(1) which provides an exception to Rule 98(a). In accordance with Rule 98(d)(1), the IDS dated June 29, 2002 refers to the '198 application, which contains legible copies of all listed references. If the Examiner cannot locate a legible copy of a reference in the '198 application, the Applicants request that the Examiner bring this to the attention of the Applicants in a subsequent Official Action so that copies can be provided. Otherwise, the Applicants respectfully request consideration of the unconsidered references.

Claims 1-46 are pending in the present application, of which claims 1-12, 19, and 20 are independent. Claims 1 and 7 have been amended herewith to more clearly recite the present invention. For the reasons set forth in detail below, all claims are believed to be in condition for allowance.

Paragraph 2 of the Official Action rejects claims 18 and 31-46 under 35 U.S.C. § 112, second paragraph, asserting that the scope of the claims cannot be determined and that the claims are vague and definite. The Official Action asserts that the scope of the term "semiconductor device" is limited to "a thin crystalline silicon film transistor

(TFT)" (pages 2-3, Paper No. 13) and does not acknowledge the teaching in the specification of the present invention to the contrary, as discussed in detail below.

With respect to claims 18, 31 and 32, the specification teaches that the term "semiconductor device" means any device functioning by using semiconductor characteristics (page 1, lines 11-16). As such, the semiconductor device includes not only a single semiconductor component such as a thin film transistor (TFT), but also an electro-optical device including TFTs, a semiconductor circuit including TFTs and electronic equipment including TFTs. The specification also teaches that such electronic equipment includes a video camera, a digital camera, etc. as recited in claims 18, 31, and 32 (pages 22-23). The Applicants further submit that one with ordinary skill in the art is capable of determining the scope of the claims in light of the specification and that the scope includes an electro-optical device including TFTs, a semiconductor circuit including TFTs and electronic equipment including TFTs. Therefore, the Applicants respectfully submit that claims 18, 31 and 32 are definite.

With respect to claims 33-46, the specification teaches that the semiconductor device of the present invention can also be used when an active matrix type electro-optical device such as a liquid crystal display device or an EL (electroluminescence) display device is fabricated (pages 16-17). Therefore, the Applicants respectfully submit that the scope of claims 33-46 is definite. Reconsideration is requested.

Paragraph 4 of the Official Action rejects claims 1-17 and 19-30 as unpatentable over U.S. Patent 6,077,731 to Yamazaki et al. in view of Japanese patent 09-186336 to Kudo et al. The Applicants respectfully submit that a *prima facie* case of obviousness cannot be maintained against independent claims 1 and 7 of the present invention, as amended. Also, the Applicants respectfully traverse the rejection of independent claims 2-6, 8-12, 19 and 20, because the Official Action has not made a *prima facie* case of obviousness.

As stated in MPEP §§ 2143-2143.01, to establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the

prior art reference (or references when combined) must teach or suggest all the claim limitations. Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art. "The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art." *In re Kotzab*, 217 F.3d 1365, 1370, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000). See also *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).

The prior art, either alone or in combination, does not teach or suggest all the features of the independent claims. Independent claims 1 and 7 have been amended to recite removing a natural oxidation film formed on a surface of a semiconductor film after irradiation of a laser light. These amendments are supported in the specification at page 6, lines 7-15. Although Yamazaki may teach eliminating a thermal oxide film 6 (column 38, lines 34-39), it appears that Yamazaki fails to teach the removal of a natural oxidation film. Further, a natural oxidation film, as described in the specification of the present invention, is not a thermal oxide film. Therefore, Yamazaki fails to teach or suggest all the features of independent claims 1 and 7, as amended.

With respect to independent claims 2, 3, 5, 6, 8, 9, 11 and 12, the Official Action asserts that Yamazaki teaches leveling a surface of a semiconductor film by heating in a reducing atmosphere such as hydrogen or inert gases such as nitrogen. The Applicants respectfully disagree, because Yamazaki teaches that the reducing or inert gases are part of a crystallization step (column 36, line 51 to column 37, line 5), not a leveling step. There is no teaching or suggestion in Yamazaki for using the reducing or inert gases from the crystallization step in a leveling step. Thus, Yamazaki fails to teach or suggest all the features of independent claims 2, 3, 5, 6, 8, 9, 11, and 12.

Regarding independent claims 4-6, 10-12, 19 and 20, the Official Action asserts that Yamazaki teaches leveling a surface of a semiconductor film by heating and by containing the concentration of oxygen or oxide compound to less than 1 ppm. The

Applicants again disagree for a similar reason to that stated above. It should be noted that Yamazaki teaches an oxygen concentration of less than 1 ppm in a crystallization step (last paragraph of column 36), not a leveling step. On the other hand, independent claims 4-6, 10-12, 19 and 20 of the present invention recite an oxygen or oxygen compound concentration of 10 ppm or less in the leveling step. A crystallization step is not the same as a leveling step. Thus, Yamazaki fails to teach an oxygen or oxygen compound concentration of 10 ppm or less in the leveling step, as recited in claims 4-6, 10-12, 19 and 20.

Kudo does not cure the deficiencies in Yamazaki. In the Official Action, Kudo is relied upon to show an irradiation of a laser light in an atmosphere containing air. Kudo does not teach or suggest removal of a natural oxidation film, a reducing atmosphere in a leveling step, and a concentration of an oxygen or oxygen compound of 10 ppm or less in a leveling step.

Since Yamazaki and Kudo, taken alone or in combination, do not teach or suggest all the claim limitations, a *prima facie* case of obviousness cannot be maintained. Accordingly, reconsideration and withdrawal of the rejection of claims 1-17 and 19-30 under 35 U.S.C. § 103(a) is in order and respectfully requested.

Should the Examiner believe that anything further would be desirable to place this application in better condition for allowance, the Examiner is invited to contact Applicants' undersigned attorney at the telephone number listed below.

Respectfully submitted,

  
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**VERSION WITH MARKINGS TO SHOW CHANGES MADE**

**IN THE CLAIMS:**

Please amend claims 1 and 7 as follows:

1. (Twice Amended) A method of manufacturing a semiconductor device comprising the steps of:

forming a semiconductor film comprising silicon over a substrate;

irradiating said semiconductor film with laser light in air for crystallizing said semiconductor film;

removing [an oxide] a natural oxidation film formed on a surface of the semiconductor film by etching after the irradiation of the laser light; and

leveling the surface of the semiconductor film by heating after removing said [oxide] natural oxidation film.

7. (Amended) A method of manufacturing a semiconductor device comprising the steps of:

forming a semiconductor film comprising silicon over a substrate;

irradiating said semiconductor film with laser light in air for crystallizing said semiconductor film;

treating a surface of the semiconductor film with a hydrofluoric acid to remove a natural oxidation film formed on the surface of the semiconductor film after the irradiation of the laser light; and

leveling the surface of the semiconductor film by heating after the treatment with said hydrofluoric acid.